

**REMARKS**

**I. Status of the claims**

Claims 1-29 are pending in this application. Claim 1 has been amended to clarify that component (ii) induces orientation in component (i) when photo-oriented. Support for this amendment appears in the specification at page 3, lines 20-24, on page 6, line 26 to page 7, line 11, and in original claim 26.

**II. Rejection under 35 U.S.C. § 102(b)**

Claims 1-7, 11, 16-17 and 19-20 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,098,975 to Omelis et al. ("Omelis") as evidenced by U.S. Patent No. 5,262,882 to Hikmet.

The Examiner provided the following comments on page 2 of the Office Action in support of the rejection:

Regarding claims 1, 5-6, Omelis et al. has a polymerisable mixture comprising at least the following two components: (i) a liquid crystal monomer having cross-linkable groups (stilbene monomer I-A) and (ii) a photo-orientable monomer (dye monomer II-A) (column 12, lines 55-65). As seen on the next page [of the Office Action], the stilbene group is liquid crystalline (mesogenous) with the two vinylic double bonds providing the cross-linkable groups in monomer I-A (column 2, lines 55-65) and the azobenzene linking group provides the cis-trans isomerizable photo-orientable group (claim 5) for the azo dye monomer (column 6, lines 10-25) (claim 6) which is monomer II-C.

Pages 3-4 of the Office Action discuss the rejection of claims 2-4, 7, 11, 16-17 and 19-20. Applicants traverse this rejection as it pertains to at least claim 1 for the reasons explained below. All other rejected claims depend from claim 1 and should be patentable for the same reasons.

Claim 1 recites a polymerisable mixture comprising at least the following two components:

- (i) a liquid crystal monomer or pre-polymer having cross-linkable groups; and
- (ii) a photo-orientable monomer or oligomer or polymer that, when photo-oriented, induces an alignment of the liquid crystal monomer or pre-polymer.

As mentioned in MPEP § 2131, a claim is anticipated only if each and every element in the claim is found in a prior art reference. In this instance, the Examiner has not established that Omelis teaches every element of claim 1.

The text of the Office Action reproduced above cites to col. 12, lines 55-65, of Omelis as teaching a mixture comprising a liquid crystal monomer I-A having cross-linkable groups and a photo-orientable monomer II-A. This cited text corresponds to Example 3 of the patent. The portion of the Office Action quoted above, however, then refers to an azo dye monomer II-C. Monomer II-C does not appear in Example 3, but is instead used in Example 1. Example 1 discloses a mixture of monomer II-A, monomer II-C and monomer I-A. It is therefore not clear from the Office Action whether the Examiner believes that claim 1 is unpatentable in view of a mixture of monomer I-A with monomer II-A, or in view of a mixture of monomer I-A with monomers II-A and II-C, or in view of either mixture. Nonetheless, it is clear that the rejection on either basis should not be sustained.

The mixture of monomer I-A and II-A in Example 3 of Omelis is polymerized and then cross-linked using photo-irradiation after it is applied to a support. Orientation is imposed by means of stretching as outlined in column 11, lines 46-68. The Office Action appears to assume that monomer I-A should correspond to component (i) according to claim 1 and monomer II-A should correspond to component (ii).

For monomer II-A to fulfill the criteria of component (ii), the following properties need to be established: it must be (a) photo-orientable and (b) when photo-oriented, it must induce an alignment of component (i). Monomer II-A in Omelis is not disclosed as fulfilling either of properties (a) or (b). This is because monomer II-A does not comprise a group that, upon photo-irradiation, adopts a certain orientation. In the Office Action, monomer II-A is stated to be photo-orientable (see page 2, 6th line from the bottom). The Office Action does not substantiate this assertion at all. There is simply no indication that monomer II-A is photo-orientable, and applicants have no reason to believe that it is. For at least this reason, the mixture according to Example 3 of Omelis should not anticipate claim 1.

Turning to Example 1, the mixture of monomers I-A, II-A and II-C is also polymerized and then cross-linked using photo-irradiation after it is applied to a support. Orientation is imposed by means of stretching as outlined in column 11, lines 46-68. The Office Action appears to assume that monomer I-A should correspond to component (i) according to claim 1 and monomer II-C may correspond to component (ii). For monomer II-C to fulfill the

criteria of component (ii), the following properties need to be established: it must be (a) photo-orientable and (b) when photo-oriented, it must induce an alignment of component (i). Although monomer II-C may be (a) photo-orientable, Omelis does not disclose (b) that the photo-orientation of monomer II-C would induce alignment if photo-oriented. Instead, and as explained repeatedly above, the orientation in Omelis is induced by the totally different mechanism of stretching of the polymerized and cross-linked polymer. There is no indication in Omelis that monomer II-C, if photo-oriented, would induce an alignment in a component (i). For at least this reason, the mixture according to Example 1 of Omelis should not anticipate claim 1.

On page 4 of the Office Action, the Examiner acknowledges that Omelis fails to teach that a photo-orientable material, when oriented, induces an alignment in liquid crystals. The Examiner concludes, however, that the material would inherently do so, especially in view of Figure 2 of Hikmet. It is unclear from the Office Action whether the Examiner believes that monomer II-A, monomer II-C, or both, if photo-oriented, would inherently align liquid crystals. Nonetheless, it is clear that the Examiner has not provided sufficient evidence establishing that either would inherently perform the recited function.

As explained in MPEP § 2112, the Examiner has the burden of establishing the alleged inherent features in the prior art:

In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.

*Id.* (quoting *Ex parte Levy*, 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)).

The Office Action does not "provide a basis in fact and/or technical reasoning" to support the assertion that either monomer II-A or II-C inherently meets the limitations of component (ii) of claim 1. The reference to Figure 2 of Hikmet certainly does not provide such facts or technical reasoning.

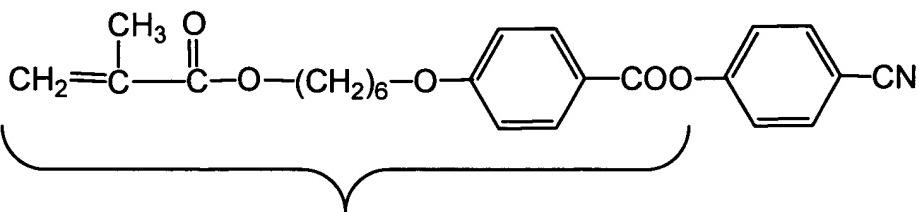
First of all, the disclosure of Hikmet does not discuss photo-orientation, but instead discusses orientating indirectly by means of contact with the surface of a rubbed mold. In this regard, Hikmet teaches the use of a template which is a rubbed orientation layer. This template is subsequently coated with a mixture comprising the molecule according to Figure

2, cross-linked and subsequently the template is removed. The surface now accessible apparently can be used as an orientation layer.

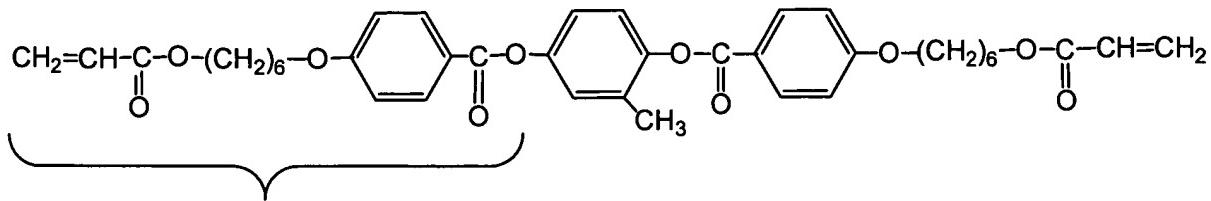
It may well be that using the process as disclosed in Hikmet might lead to a system which can act as an orientation layer. But it does not follow that the structure according to Figure 2 can necessarily be oriented by irradiation of light or that any photo-orientation would necessarily induce orientation in adjacent liquid-crystal systems. Said another way, knowledge that a molecule can be oriented by rubbing or by a template and subsequently has the ability of inducing orientation, does not lead to the conclusion that the same molecule can be oriented by photo-orientation and then also has the ability of inducing orientation. Since it is not even disclosed that the compound of Figure 2 in Hikmet might be photo-orientable, and at the same time have the ability of inducing orientation, it seems inappropriate to conclude that Figure 2 suggests that other compounds, such as monomer II-A and II-C in the totally different reference of Omelis, would necessarily do so.

The structural differences between the compounds of Hikmet and Omelis, moreover, are so significant that applicants do not agree that the properties of the former are necessarily indicative of relevant inherent properties of the latter. When comparing monomer II-A

Monomer II-A



with the structure according to a Figure 2 of Hikmet,



one clearly notices that the only similarity between these two components is the tail portion on the left side, i.e. the acrylate portion with the corresponding spacer. The person skilled in the art would recognize the structure according to Figure 2 of Hikmet as being a crosslinkable liquid-crystalline monomer. The person skilled in the art, however, also knows

that this molecule is not similar to monomer II-A or II-C with respect to liquid-crystallinity or orientability.

The ability of liquid-crystalline materials to induce an orientation depends on the specific combination of chain elements and ring elements. The molecule according to Figure 2 in Hikmet is much longer than monomer II-A, does not have a terminal cyano-group, it is symmetric and has two identical tail portions, and the central structural element comprising the three benzene rings is much longer and much more rigid than the ring systems of the monomers II-A, let alone II-C where not even the tail portion is similar. The mere fact that a molecule has two crosslinkable ethylene groups does by no means imply that such a molecule also has the ability of inducing orientation, as alleged by the Examiner.

Since Hikmet discloses an entirely different chemical structure in the context of a completely different process for making orientation layers, compared to the Omelis disclosure, applicants see no reasonable basis to conclude that Hikmet proves that the monomers II-A or II-C, if photo-oriented, would necessarily induce orientation in component (i) which is mixed therewith. Applicants therefore respectfully request that the Examiner withdraw this rejection.

### **III. First rejection under 35 U.S.C. § 103(a)**

The Examiner rejected claims 8-10, 12-14, 18, 21-22 and 24 under 35 U.S.C. § 103(a) as obvious over Omelis in view of U.S. Patent No. 5,602,661 to Schadt et al. ("Schadt"), as evidenced by Hikmet. In making this rejection, the Examiner relied on Omelis as teaching a mixture as claimed in claim 1 and on Schadt as teaching the presence of other dichroic dyes and chiral additives and the liquid crystalline phases of the liquid crystal monomer. Omelis does not teach or suggest the mixture of claim 1 for the reasons explained above. The disclosure of Schadt does not fill the gaps missing in the Omelis patent to render claim 1 obvious and, as a result, the claims included in this rejection would not have been obvious.

### **IV. Second rejection under 35 U.S.C. § 103(a)**

The Examiner rejected claim 15 under 35 U.S.C. § 103(a) as obvious over Omelis in view of U.S. Patent No. 5,589,237 to Akashi et al. ("Akashi"), as evidenced by Hikmet. In making this rejection, the Examiner relied on Omelis as teaching a mixture

as claimed in claim 1 and on Akashi as teaching the presence of fluorescent molecules. Omelis does not teach or suggest the mixture of claim 1 for the reasons explained above. The disclosure of Akashi does not fill the gaps missing in the Omelis patent to render claim 1 obvious and, as a result, claim 15 would not have been obvious either.

**V. Third rejection under 35 U.S.C. § 103(a)**

The Examiner rejected claims 23 and 25 under 35 U.S.C. § 103(a) as obvious over Omelis in view of U.S. Patent No. 5,706,131 to Ichimura et al. ("Ichimura"), as evidenced by Hikmet. In making this rejection, the Examiner relied on Omelis as teaching a mixture as claimed in claim 1 and on Ichimura as teaching the polymerization of a mixture in a preferred orientation direction. Omelis does not teach or suggest the mixture of claim 1 for the reasons explained above. The disclosure of Ichimura does not fill the gaps missing in the Omelis patent to render claim 1 obvious and, as a result, claims 23 and 25 would not have been obvious either.

In view of the amendments and remarks above, the pending claims should be patentable over the cited documents. Please grant any extensions of time required to enter this Amendment and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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Dated: January 4, 2005

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